

### REMARKS

In an Office Action dated June 3, 2003, claims 1-11, all of the claims under consideration in the subject patent application were rejected. By amendment above the specification has been corrected on page 42, line 21. By amendment above, claims 5-8 have been rewritten. Support for the amendments to claim 5-8 can be found on page 31, lines 16-26 and page 40, lines 4-12 of the specification. By amendment above the drawing of figure 2(e) has been corrected.

Reconsideration of this application and allowance of the claims is respectfully requested in view of the foregoing amendments and the following remarks.

The Examiner has objected to the specification because on page 42, line 21 the specification recites "auxiliary layers 6", which layer 6 has previously been designated in both the specification and the drawings as "additional metal layers 6". Applicants have amended the specification to replace the recitation of "auxiliary layers 6" to "additional metal layers 6" on page 42, line 21. Applicants submit that this correction of the specification does not add new matter to the specification.

The Examiner has objected to the drawings because in figure 2(e) "etching resist layer 8" should be designated as "internal circuits 4". Applicants have amended figure 2(e) correcting the designation of the "internal circuit 4" in the figure. Applicants submit that this correction makes the objection moot and respectfully request withdrawal of the Examiner's objection to the drawings.

The Examiner has objected to claims 5-8 because according to the Examiner claim 5 and claim 7 are substantially duplicates of each other and claims 6 and 8 are substantially duplicates of each other. According to the Examiner the step of removing the nickel or cobalt layer and the

step of performing the interlayer connection layer formation are reversed between claims 5 and 7 and between claims 6 and 8, but the claims are in open language and do not specify a sequential order. Applicants submit that claims 5-8, as amended recite a sequential order by identifying each step with a sequential identifier ( a, b, c, etc.) and by inserting the term "in order" to read "comprising in order the steps of:". The amendments to claims 5-8 reciting a sequential order of steps establishes that the step of removing the Nickel or Cobalt and the step of performing the interlayer connection layer formation follow in sequential order as recited in the claims. Therefore, claim 5 is different from claim 7, and claim 6 is different from claim 8. Applicants submit that the objection of the Examiner to claims 5-8, as amended is moot and respectfully request withdrawal of the objection.

Claims 1-3 were rejected as obvious over Gaku (EP 1097806) in view of Mayhew (US 3734616). The Examiner asserted that Gaku discloses a method for making a copper clad printed wiring board. The copper clad board is obtained by disposing a double-sided treated copper foil provided with a metallic treatment layer having a high absorption rate of a carbon dioxide laser energy, according to the Examiner. The Examiner further asserted that the metallic treatment layer allows a hole to be made by directly irradiating the surface of the copper foil, and the metallic treatment layer may be a nickel, cobalt or zinc plating. Further, the Examiner stated that the metallic treatment and thermosetting resin layer laminate are formed under heat and pressure, and after the hole is made, the burrs are removed using mechanical polishing or chemical etching. Then the surface is copper plated, forming an interlayer connection, and circuits are formed to prepare the printed wire board. According to the Examiner Gaku does not disclose anything about the preferred thickness of the metallic treatment layer, however Gaku teaches in

the examples that this layer is within the range of 1-4 $\mu$ m. The Examiner asserted that the optimal thickness of the metal layer in the current invention can be determined by routine experimentation. In addition, the Examiner stated that Mayhew teaches the usual method for making printed circuit boards, using a layer of photoresist, exposing the resist to light, developing the photoresist and applying well known etching methods to leave only the circuit, and alleges that it would have been obvious to use these techniques on the printed circuit board in the method by Gaku.

Applicants submit that in the method disclosed in Gaku the metallic treatment layer is permanently applied on the board, as there is no method provided for peeling or removing this metallic treatment layer from the copper clad laminate after a hole is made with a laser. The present invention requires using an etching method and a physical method, singly or in combination, to remove the metallic treatment layer from the copper-clad laminate after the laser drilling. Therefore, the copper-clad laminate of Gaku is very different from the copper-clad material of the present invention. In addition, the only etching either mechanical (polishing) or chemical appears to be performed only in the hole just made, again suggesting that there is no teaching in Gaku with respect to removal of the metallic treatment layer. Furthermore, Gaku discloses that the metallic treatment layer is applied to the copper-clad material by heating and pressure in order to form an alloy with the copper material. In the present invention, no alloy of copper and the metal layer is made, as it is intended that the metal layer be removed after drilling of a hole with a laser. Further, Applicants submit that Gaku uses a thermosetting resin with the metallic treatment layer. This suggest that on top of the copper layer a metallic treatment layer and a thermosetting layer are applied. These layers together would limit heat dissipation from

the location where a hole is drilled with a laser and increase heat absorption. This is different from the present invention as the metal itself, or a nickel-alloy in case of nickel, is the only component of the metal layer for improved ease of drilling a hole with a laser. Therefore, Gaku teaches the use of a metallic treatment layer with a thermosetting resin on the copper foil, wherein the metal forms an alloy with the copper, to improve drilling of a hole in the board with a laser. The metallic treatment layer is not removed from the copper layer. In contrast, in the current invention the metal layer is deposited onto the copper foil to improve ease of drilling a hole with a laser after which the metal layer is removed. Thus, Gaku does not teach or suggest the method of the present invention which is clearly unobvious over Gaku. Mayhew does not cure the deficiencies in the Gaku reference as Mayhew merely teaches the conventional method of preparing a circuit board as reflected in the method of the present invention after interlayer connection has been formed. This is subsequent to the steps which are discussed above.

Applicants therefore submit that claims 1-3 of the pending application are not obvious over Gaku (EP 1097806) in view of Mayhew (US 3,734,616). Withdrawal of the rejection is respectfully requested.

Claim 4 was rejected as obvious over Gaku in view of Mayhew as applied to claim 1 and further in view of Kossler (US 4025358). The Examiner asserted that removing the nickel layer using sulfuric acid, sulfuric acid/nitric acid or sulfuric/nitrobenzenesulfonic acid is obvious as Kossler teaches that nickel layers can be removed using a bath of sulfuric and nitric acids.

Applicants submit that, as discussed above, the method according to claim 1 is unobvious over Gaku and Mayhew as they do not disclose the removal of the metal layer in a process of drilling a hole in a copper clad laminate for a printed wire board. Kossler is not related to the

field of printed wire boards and merely teaches that nickel may be dissolved from a material which has a light metal layer covered with a layer of nickel. There is no motivation to combine Gaku and Mayhew with Kossler as these references are in a different technological field and because Gaku does not teach or suggest removing the metallic treatment layer after drilling the hole in the copper foil with a laser.

Applicants therefore submit that claim 4 of the pending application is not obvious over Gaku (EP 1097806) in view of Mayhew (US 3,734,616) in further view of Kossler (US 4,025,358). Withdrawal of the rejection is respectfully requested.

Claims 5-11 were rejected as obvious over Gaku in view of Mayhew and Kotaoka (US 6319620). The Examiner indicated that the Kataoka reference is assigned to the same assignee and has common inventors. Applicants submit that the present invention and the subject matter of this reference were owned by the same person at the time the present invention was made. Therefore, Kotaoka is not 35 U.S.C. §102(e) prior art to the present invention. Similarly, as discussed above the present invention is non-obvious over Gaku in view of Mayhew as these references do not teach or suggest removing the metallic treatment layer after drilling the hole in the copper foil with a laser as is required by the claims of the present application.

Applicants therefore submit that claims 5-11 of the pending application are not obvious over Gaku (EP 1097806) in view of Mayhew (US 3,734,616) in further view of Kotaoka (US 6,319,620). Withdrawal of the rejection is respectfully requested.

Claims 5-9 were rejected as obvious over Gaku in view of Mayhew and Caule (US 3,833,433). The Examiner stated that Gaku and Mayhew do not disclose an organic layer on the surface of the copper foil, or that this organic layer is formed from one or more of a nitrogen

containing compound, a sulfur containing compound and carboxylic acids. However, according to the Examiner Caule teaches that in the manufacture of printed circuit boards the copper foil normally will have a film of benzotriazole on it in order to prolong shelf life before the manufacturing process. The Examiner asserted that it would have been obvious to use an organic layer of nitrogen containing benzotriazole on the copper foil in the method of Gaku in view of Mayhew.

Applicants submit that the Caule reference provides for a new method of producing a copper foil laminate. The reference discloses that the use of benzotriazole has problems when further processing is performed. These problems include blistering of the laminate and poor bonding. Thus the Caule reference teaches away from using benzotriazole in copper foils. In addition, the object of the Caule reference is strong bonding of the laminate to form the copper foil laminate.

Claims 5-9 of the present application require forming an organic layer on a surface of a copper foil residing in an external layer of a copper-clad laminate. Claim 9 further requires that this organic layer is formed from one or more of a nitrogen containing, a sulfur containing compound and carboxylic acids. In the present invention the organic layer is easily peelable (an undesired property in the Caule reference) for processing (removal) after drilling a hole with the laser has been performed, whereas the organic layer in Caule needs to form a strong bond with the copper foil to form a laminate. Therefore, the organic layer of the present invention is a different type of organic layer than the type of organic layer in Caule. In addition, the organic layer of the present invention may include a nitrogen containing compound which Caule attempts

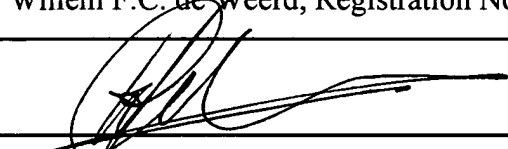
to avoid. Therefore, the Caule reference teaches away from using a type of organic layer as in the present invention and from using benzotriazole as an organic layer in copper foils.

Applicants therefore submit that claims 5-9 of the pending application are not obvious over Gaku (1097806) in view of Mayhew (US 3,734,616) in further view of Caule (3,833,433).

Withdrawal of the rejection is respectfully requested.

Applicants submit that the present application is now in condition for allowance.

Reconsideration and favorable action are earnestly requested.

RESPECTFULLY SUBMITTED,					
NAME AND REG. NUMBER	Willem F.C. de Weerd, Registration No. 51,613				
SIGNATURE				DATE	September 3, 2003
Address	Rothwell, Figg, Ernst & Manbeck 1425 K Street, N.W., Suite 800				
City	Washington	State	D.C.	Zip Code	20005
Country	U.S.A.	Telephone	202-783-6040	Fax	202-783-6031